

We claim:

1. A process for preparing a supported catalyst, in particular for the polymerization and/or copolymerization of olefins, which comprises:
  - 5 a) preparing a hydrogel;
  - b) milling the hydrogel to give a finely particulate hydrogel;
  - c) producing a slurry based on the finely particulate hydrogel;
  - d) drying the slurry comprising the finely particulate hydrogel to give the support for catalysts;
  - 10 e) producing the supported catalyst by applying at least one transition metal and/or at least one transition metal compound to the support for catalysts and, if appropriate, activating the applied metal and/or compound,  
wherein a finely particulate hydrogel in which:
    - 15 - at least 5% by volume of the particles, based on the total volume of the particles, have a particle size in the range from > 0  $\mu$ m to  $\leq$  3  $\mu$ m; and/or
    - at least 40% by volume of the particles, based on the total volume of the particles, have a particle size in the range from > 0  $\mu$ m to  $\leq$  12  $\mu$ m, and/or
    - at least 75% by volume of the particles, based on the total volume of the particles, have a particle size in the range from > 0  $\mu$ m to  $\leq$  35  $\mu$ m,is produced in step b) and a support which can be prepared as set forth in steps a) to d) is used to produce catalysts in step e).
2. A process for preparing a supported catalyst as claimed in claim 1, wherein at least one transition metal and/or at least one compound of a transition metal comprising transition metals selected from the group consisting of Sc, Y, La, Ti, Zr, Hf, V, Nb, Ta, Cr, Mo, W, Mn, Tc, Re, Fe, Ru, Os, Co, Rh, Ir, Ni, Pd, Pt, Cu, Ag, Au, Zn, Cd and Hg, preferably Ti, Zr, Cr, Fe, Ni, and Pd, is/are applied to the support for catalysts.
3. A process for preparing a support catalyst as claimed in claim 1 or 2, wherein at least one further transition metal and/or at least one further compound of a transition metal, preferably comprising transition metals selected from the group consisting of Ti, Zr, Hf, V, Cr, Fe, Co, Ni, Zn and Pd, is/are applied to the catalyst support which has been modified with at least one transition metal and/or compound of a transition metal.
- 35 4. A process for preparing a supported catalyst as claimed in any of the preceding claims, wherein at least one complex of a transition metal, preferably a metallocene compound,

preferably one comprising a transition metal selected from the group consisting of Ti, Zr, Hf, V, Cr, Fe, Co, Ni, Zn and Pd, is applied to the support for catalysts.

5. A process for preparing a supported catalyst as claimed in any of the preceding claims, wherein the catalyst support which has been modified with at least one transition metal and/or at least one compound of a transition metal is activated by thermal activation, preferably calcination and/or oxidation, halogenation, preferably fluorination, and/or addition of at least one activator compound.
- 10 6. A process for preparing a supported catalyst as claimed in any of the preceding claims, wherein a catalyst support modified with at least chromium or a chromium compound is activated by:
  - a) halogenation; and/or
  - b) thermal activation in an oxidizing, reducing and/or neutral atmosphere; and/or
  - 15 c) renewed thermal activation in a reducing atmosphere, with thermal activation being carried out in the range from 400°C to 1000°C, preferably in the range from 450°C to 900°C.
- 20 7. A supported catalyst, in particular for the polymerization and/or copolymerization of olefins, which can be prepared as claimed in any of the preceding claims.
- 25 8. A supported catalyst as claimed in claim 7, wherein the chromium content, based on the element, is from 0.1% by weight to 5% by weight, preferably from 0.2% by weight to 1.5% by weight, based on the total weight of the supported catalyst.
9. The use of a supported catalyst for the polymerization and/or copolymerization of olefins, wherein the polymerization and/or copolymerization is carried out in the presence of a supported catalyst as claimed in any of the preceding claims.
- 30 10. The use of a supported catalyst for the polymerization and/or copolymerization of olefins as claimed in claim 9, wherein the polymerization and/or copolymerization is carried out in the presence or absence of at least one activator compound.
- 35 11. The use of a supported catalyst for the polymerization and/or copolymerization of olefins as claimed in claim 9 or 10, wherein the activator compound is preferably an organometallic compound, more preferably an organometallic compound of a metal selected from the group consisting of B, Al, Zn and Si.

12. The use of a supported catalyst as claimed in any of the preceding claims, wherein the polymerization and/or copolymerization is carried out as a gas-phase fluidized-bed process and/or a suspension process.
- 5 13. The use of a supported catalyst as claimed in any of the preceding claims, wherein the polymerization and/or copolymerization in the gas-phase fluidized-bed process is carried out using a supported catalyst having a mean particle size of the catalyst particles in the range from 30  $\mu\text{m}$  to 300  $\mu\text{m}$ , preferably in the range from 40  $\mu\text{m}$  to 100  $\mu\text{m}$ .
- 10 14. The use of a supported catalyst as claimed in any of the preceding claims, wherein the polymerization and/or copolymerization in the suspension process is carried out using a supported catalyst having a mean particle size of the catalyst particles in the range from 30  $\mu\text{m}$  to 350  $\mu\text{m}$ , preferably in the range from 40  $\mu\text{m}$  to 100  $\mu\text{m}$ .
- 15 15. The use of a supported catalyst as claimed in any of the preceding claims, wherein, in a polymerization and/or copolymerization in the gas-phase fluidized-bed process, the proportion of discharged polymer having a particle size in the range from > 0  $\mu\text{m}$  to  $\leq$ 125  $\mu\text{m}$  is  $\leq$ 15% by weight, preferably  $\leq$ 5% by weight, particularly preferably  $\leq$ 3% by weight, very particularly preferably in the range from 0.3% by weight to 2% by weight, based on the total weight of the product.
- 20 16. An olefin polymer obtainable using a supported catalyst as claimed in any of the preceding claims.
- 25 17. A fiber, film or molding comprising polymers of olefins obtainable as claimed in any of the preceding claims, preferably as major or exclusive component.